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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/713,633	11/14/2000	Ramarathnam Venkatesan	MS1-650US	3022
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LEE & HAYES PLLC 421 W RIVERSIDE AVENUE SUITE 500 SPOKANE, WA 99201			YIGDALL, MICHAEL J	
			ART UNIT	PAPER NUMBER
			2192	

DATE MAILED: 01/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/713,633

Applicant(s)

VENKATESAN ET AL.

Examiner

Michael J. Yigdoll

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 September 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4, 6-15 and 18-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-4, 6, 7 and 18-22 is/are allowed.
- 6) ☒ Claim(s) 8-13 and 15 is/are rejected.
- 7) ☒ Claim(s) 14 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This Office action is responsive to Applicant's submission filed on September 29, 2005. Claims 1-4, 6-15 and 18-22 are pending.

Response to Arguments

2. Applicant's arguments with respect to independent claims 8, 11 and 13 have been fully considered but they are not persuasive.

Applicant contends that there is no suggestion or motivation to combine or modify Schweitz with the teachings of Hsu. While a suggestion or motivation to do so found within the references themselves was set forth in the Office action, Applicant contends that the suggestion or motivation is "misplaced and fails to explain why the combination is proper, as both Schweitz and Hsu already provide for addressing the differences found between two graphical programs" (remarks, page 18, first complete paragraph).

Although Schweitz and Hsu are analogous art, the examiner does not agree with Applicant's characterizations. Applicant notes that Schweitz states a purpose of "comparing the graphs to determine the changes," and that Hsu states a purpose of "detecting differences between two graphical programs" (remarks, pages 18-19, bridging paragraph). From this, Applicant declares that "it remains unclear why an artisan would have been motivated to combine these references in this way for reasons that are already addressed by both references" (remarks, page 19, first complete paragraph).

However, the suggestion or motivation set forth in the Office action "to supplement the method of Schweitz with the comparison features taught by Hsu" is in fact "for the purpose of

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creating a software patch to address the differences found between two graphical programs,” as Applicant appears to acknowledge (remarks, page 18, top paragraph). In other words, the suggestion or motivation is not merely to address the differences found between two graphical programs, but rather to create a software patch to address those differences.

Schweitz discloses creating program dependency graphs for the object files of two compiled programs, comparing the graphs to determine a minimal set of changes, and creating a patch to address the changes (see, for example, the abstract). Schweitz does not, however, expressly disclose comparing two data flow programs in the same sense as Hsu (see, for example, Hsu, FIG. 5). That is, Hsu discloses detecting the differences between two data flow programs that include interconnected graphical function blocks (see, for example, the abstract). Hsu, of course, does not expressly disclose creating a patch to address the differences detected in the two graphical programs.

Therefore, one of ordinary skill in the art would have been motivated to combine the teachings of Schweitz and Hsu to create a patch that not only addresses the differences in the object files of two compiled programs, but one that is also able to address the differences in the data flow graphs of two graphical programs.

Applicant contends, with respect to claim 8, that the suggestion or motivation to modify Hsu with the teachings of Floratos “for the purpose of systematically exploring the edges of the graph to compute the neighborhood of each block” is similarly “misplaced and fails to explain why the combination is proper” (remarks, page 23, last paragraph). Applicant further contends that the modification would render Hsu unsatisfactory for its intended purpose (remarks, page 24, first paragraph).

However, the examiner again does not agree with Applicant's characterizations. Hsu already discloses traversing the two graphs (see, for example, column 14, lines 65-67) and comparing neighborhoods of the graphs (see, for example, step 128 in FIG. 8 and column 13, lines 60-63). Hsu is merely silent as to the method of traversal, such as whether the traversal is depth first or breadth first. Floratos, on the other hand, expressly discloses that breadth first searches or traversals are well known in the art, and that the method steps for performing breadth first searches or traversals are well documented in the literature (see, for example, column 7, lines 58-63). Thus, it would have been obvious to perform a breadth first traversal in Hsu, given that such traversals are so well known and well documented.

Floratos further teaches that the purpose of a breadth first search or traversal is to systematically explore the edges of a graph to discover every vertex that is reachable from the source vertex (see, for example, column 7, lines 63-67). Hsu, in fact, traverses the graphs to find exact matching objects and subgraphs (see, for example, column 14, lines 59-67). One of ordinary skill in the art would have been motivated to ensure that every exact matching subgraph is found, and thus would have been motivated to traverse the graphs in a manner that systematically explores those graphs. Indeed, Applicant recognizes that Hsu seeks to increase the chance of finding matching objects (remarks, page 25, top paragraph).

Applicant concludes that if Hsu were to perform a breadth first traversal, then "the two-group feature of Hsu would consolidate into a single group of non-exact matching objects," and "there would be no matching objects and the entire graph would fall into the list containing non-exact match objects" (remarks, pages 24-25, bridging paragraph). However, as noted above, Hsu already traverses the graphs, and does so to find matching objects and subgraphs. There is

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nothing to suggest that a breadth first traversal would render Hsu unsatisfactory for this purpose.

The exact matching objects and subgraphs are found *while* traversing or exploring the graphs (see, for example, column 14, line 67 to column 15, line 4), and not *after* completely traversing the graphs to such an extent that the “subgraphs” are the entire graphs themselves.

Applicant contends that Hsu does not teach, “attempting to match blocks in the procedure,” as added to claim 11 (remarks, pages 26-27, bridging paragraph). However, Schweitz in view of Hsu does teach this new element, as set forth below.

3. Applicant’s arguments with respect to independent claims 1, 18 and 21 have been fully considered and are persuasive. Accordingly, the rejection of claims 1-4, 6, 7, 14 and 18-22 under 35 U.S.C. 103(a) has been withdrawn.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 8-10, 13 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,594,822 to Schweitz et al. (art of record, “Schweitz”) in view of U.S. Patent No. 5,974,254 to Hsu (art of record, “Hsu”) in view of U.S. Patent No. 6,205,444 to Floratos et al. (art of record, “Floratos”).

With respect to claim 8 (original), Schweitz discloses a method for matching blocks between a first control flow graph (CFG) representation of a portion of a first program and a second CFG representation of a portion of a second program (see, for example, the abstract and graphs 150 and 155 in FIG. 2), the method comprising:

(a) matching blocks between the first and second CFG representations based upon the content of the blocks (see, for example, FIG. 3C);

(b) detecting outliers, wherein outliers are blocks in the first CFG representation that do not match any block in the second CFG representation during the matching step (see, for example, column 4, lines 29-32).

Schweitz does not expressly disclose the step of:

(c) computing a neighborhood of each block in the first and second CFG representation by performing a breadth first traversal.

However, Hsu discloses matching the graph representations of first and second programs to identify similarities and differences (see, for example, column 4, line 46 to column 5, line 6). Hsu further discloses traversing the graphs (see, for example, column 14, lines 65-67) and examining the neighborhoods in the graphs (see, for example, step 128 in FIG. 8 and column 13, lines 60-63).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to supplement the method of Schweitz with the neighborhood features taught by Hsu, for the purpose of creating a software patch (see, for example, Schweitz, abstract) to address the differences found between two graphical programs (see, for example, Hsu, abstract).

Although Hsu is silent as to the method of traversal, a breadth first search or traversal is well known in the art. Floratos, for example, discloses that breadth first searches are well known and well documented in the art for systematically exploring the edges of a graph to discover every reachable vertex from a source vertex (see, for example, column 7, lines 53-67).

It would have been obvious to one of ordinary skill in the art at the time the invention was made that the traversal of Hsu be performed as a breadth first traversal, as is well known in the art and as taught by Floratos, for the purpose of systematically exploring the edges of the graph to compute the neighborhood of each block.

Therefore, Schweitz in view of Hsu in view of Floratos discloses computing a neighborhood of each block in the first and second CFG representation by performing a breadth first traversal.

Schweitz in view of Hsu in view of Floratos further discloses the step of:

(d) removing the outliers from each neighborhood (see, for example, Schweitz, column 1, lines 25-28 and column 4, lines 29-32).

With respect to claim 9 (previously presented), Schweitz in view of Hsu in view of Floratos further discloses:

(a) computing labels for each block in first and second CFG representations based upon content of a block (see, for example, Hsu, column 11, lines 23-27, which shows computing an object ID or label for each object or block, and column 12, line 66 to column 13, line 4, which shows that the object ID or label is based on the type or content of the object or block);

(b) for each neighborhood computed in the computing step, forming a “d-label” for each block in a neighborhood based upon labels of the blocks within the neighborhood (see, for

example, Hsu, column 13, lines 60-67, which shows forming a score or “d-label” for each block in each neighborhood according to the object type or object ID or label);

(c) attempting to match blocks between first and second CFG representations by comparing the d-labels of the blocks (see, for example, Hsu, column 9, lines 32-36, which shows matching the blocks by comparing scores or “d-labels”).

With respect to claim 10 (original), Schweitz in view of Hsu in view of Floratos further discloses a computer-readable medium having computer-executable instructions that, when executed by a computer, performs the method as recited in claim 8 (see, for example, Schweitz, column 9, lines 54-55, and see the rejection of claim 8 above).

With respect to claim 13 (previously presented), Schweitz discloses a method for matching of blocks in a procedure of a first control flow graph (CFG) representation of a portion of a first program between an ostensibly matching procedure of second CFG representation of a portion of second program (see, for example, the abstract and graphs 150 and 155 in FIG. 2), the method comprising:

(a) matching blocks between the first and second CFG representations based upon the content of the blocks (see, for example, FIG. 3C);

Schweitz does not expressly disclose the step of:

(b) computing successively smaller neighborhoods of each block in the first and second CFG representations via breadth first traversals.

However, Hsu discloses matching the graph representations of first and second programs to identify similarities and differences (see, for example, column 4, line 46 to column 5, line 6).

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Hsu further discloses traversing the graphs (see, for example, column 14, lines 65-67) and examining the neighborhoods in the graphs (see, for example, step 128 in FIG. 8 and column 13, lines 60-63).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to supplement the method of Schweitz with the neighborhood features taught by Hsu, for the purpose of creating a software patch (see, for example, Schweitz, abstract) to address the differences found between two graphical programs (see, for example, Hsu, abstract).

Although Hsu is silent as to the method of traversal, a breadth first search or traversal is well known in the art. Floratos, for example, discloses that breadth first searches are well known and well documented in the art for systematically exploring the edges of a graph to discover every reachable vertex from a source vertex (see, for example, column 7, lines 53-67). Floratos further discloses performing a breadth first search to prune a graph of “infeasible” objects (see, for example, column 8, lines 1-7 and line 66 to column 9, line 6), so as to remove objects that would otherwise preclude finding the best matches among a plurality of sequences (see, for example, column 4, lines 21-26).

It would have been obvious to one of ordinary skill in the art at the time the invention was made that the traversal of Hsu be performed as a breadth first traversal, as is well known in the art and as taught by Floratos, for the purpose of systematically exploring the edges of the graph to compute the neighborhood of each block. Furthermore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to prune the neighborhoods of Hsu, such as taught by Floratos, so as to remove objects or blocks in the graphs that would

otherwise prevent matching the blocks. Pruning a neighborhood would result in a successively smaller neighborhood.

Therefore, Schweitz in view of Hsu in view of Floratos discloses computing successively smaller neighborhoods of each block in the first and second CFG representations via breadth first traversals.

Schweitz in view of Hsu in view of Floratos further discloses the step of:

(c) for each neighborhood computed in the computing step, forming a “d-label” for each block in a neighborhood based upon labels of the blocks within the neighborhood (see, for example, Hsu, column 13, lines 60-67, which shows forming a score or “d-label” for each block in each neighborhood according to the object type or object ID or label);

(d) attempting to match blocks between first and second CFG representations by comparing the d-labels of the blocks (see, for example, Hsu, column 9, lines 32-36, which shows matching the blocks by comparing scores or “d-labels”).

With respect to claim 15 (original), Schweitz in view of Hsu in view of Floratos further discloses a computer-readable medium having computer-executable instructions that, when executed by a computer, performs the method as recited in claim 13 (see, for example, Schweitz, column 9, lines 54-55, and see the rejection of claim 13 above).

6. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schweitz in view of Hsu.

With respect to claim 11 (currently amended), Schweitz discloses a method for matching procedures between a first control flow graph (CFG) representation of a portion of a first

program and a second CFG representation of a portion of a second program (see, for example, the abstract, and graphs 150 and 155 in FIG. 2), wherein a procedure comprises multiple blocks in a CFG representation (see, for example, column 5, lines 58-62, which shows that a function or procedure comprises multiple nodes or blocks in a graph representation).

Although Schweitz discloses comparing the content and lengths of functions or procedures to determine the number of matching nodes or blocks (see, for example, column 9, lines 5-8), Schweitz does not expressly disclose:

(a) computing a procedure-match-criterion for a procedure in the second CFG representation, where the procedure-match-criterion for a procedure in the second CFG representation represents the number of matching blocks between that procedure and a specified procedure in the first CFG representation;

However, Hsu discloses matching the graph representations of first and second programs to identify similarities and differences (see, for example, column 4, line 46 to column 5, line 6). Hsu further discloses computing a score that represents the degree of matching between objects of the first and second programs (see, for example, column 9, lines 32-36). Hsu further discloses that the scores are stored in a matrix and resolved so as to represent the number of matching objects (see, for example, column 13, lines 22-40). Thus, Hsu discloses a score or criterion that represents the number of matching objects.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to supplement the method of Schweitz with the match criterion features taught by Hsu, for the purpose of creating a software patch (see, for example, Schweitz, the abstract) to address the differences found between two graphical programs (see, for example, Hsu, the abstract).

Therefore, Schweitz in view of Hsu discloses computing a procedure-match-criterion for a procedure in the second CFG representation, where the procedure-match-criterion for a procedure in the second CFG representation represents the number of matching blocks between that procedure and a specified procedure in the first CFG representation.

Schweitz in view of Hsu further discloses the step of:

(b) matching procedures in the second CFG representation with the specified procedure in the first CFG representation based upon the procedure-match-criteria for the procedures in the second CFG representation (see, for example, Schweitz, FIG. 3C);

(c) attempting to match blocks in the procedure in the second CFG representation with blocks in the specified procedure in the first CFG representation (see, for example, Hsu, column 9, lines 28-42, which shows attempting to match objects or blocks in the second program with objects or blocks in the first program).

With respect to claim 12 (original), Schweitz in view of Hsu further discloses a computer-readable medium having computer-executable instructions that, when executed by a computer, performs the method as recited in claim 11 (see, for example, Schweitz, column 9, lines 54-55, and see the rejection of claim 11 above).

Allowable Subject Matter

7. Claims 1-4, 6, 7 and 18-22 are allowed. Claim 14 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

8. The following is a statement of reasons for the indication of allowable subject matter:

The prior art of record does not teach, in the express manner and combination recited in the allowable claims, matching or comparing the content of the blocks in the control flow graphs of two programs based on the augmented local neighborhoods of the blocks, wherein the augmented local neighborhoods consist of the local neighborhoods of the blocks plus random samplings of blocks from substantially larger neighborhoods, but less than all of the blocks in the control flow graphs.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to Applicant's disclosure. U.S. Patent No. 5,379,422 to Antoshenkov discloses simple random sampling on pseudo-ranked hierarchical data structures in a data processing system. U.S. Patent No. 5,710,916 to Barbara et al. discloses a method and apparatus for similarity matching of handwritten data objects. U.S. Patent No. 6,189,116 to Mongan et al. discloses complete, random ordered traversal of cyclic directed graphs.
10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael J. Yigdall whose telephone number is (571) 272-3707. The examiner can normally be reached on Monday through Friday from 7:30am to 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tuan Q. Dam can be reached on (571) 272-3695. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MJ

Michael J. Yigdall
Examiner
Art Unit 2192

mjy


TUAN DAM
SUPERVISORY PATENT EXAMINER